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SPECTROSCOPIC AND CHEMICAL EVALUATION OF CLAY MINERALS AND THEIR SUITABILITY FOR THE MANUFACTURING OF ORGANIC CLAY, MEDICINAL CLAY AND PILLARED CLAY

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The levels of trace elements concentration of the clay minerals of Pakistan have been determined. Inductively Coupled Plasma (ICP) spectrometer was used for the determination of trace elements. The samples of the clay minerals were digested in the ETHOS microwave oven at $180 \pm 5^\circ\text{C}$. The trace elements (As, Co, Cu, Cr, Cd, Fe, Mn, Ni, Pb, Se and Zn) in the clay minerals of Pakistan fall within the global range. Except as all the trace elements fall within the technical specification of the medicinal clay. The chemical analysis also shows that (SiO_2 , Al_2O_3 , Fe_2O_3 , CaO, MgO, Na_2O , and K_2O) these are within the technical specification of the medicinal clay. Therefore, at present they can be used for external use only. The trace elements (As, Co, Cu, Cr, Cd, Fe, Mn, Ni, Pb, Se and Zn) of clay mineral as well as the activated clay minerals were determined and it is observed that during activation Na, K and Ca ions are leached out. The presence of trace elements of transition metals which are used as catalysts in organic synthesis clearly demonstrate that the catalytic activity of clay minerals is due to these elements. If any of these elements is more than 1% in these clays minerals the clay will act as catalysts without activation. If the quantity of these trace elements is very small and leached out during activation the clay become inactive which is not explained by some workers. Pakistani clays are suitable for making pillared clays. At 550°C , the clay minerals are dehydroxylated and they act as Lewis acid and work as a catalyst in place of AlCl_3 . It is observed that the clay minerals make complexes with ionic or non ionic surfactant very easily. These complexes make stable suspension in water and oil. It was observed that alkyl group gives a very good organic clay with a swelling property and stable suspension and is superior to the imported clay.

Key words: Spectroscopic evaluation, Clay mineral, Medicinal clay, Pillared clay, Catalyst, Organic clay.

PALYNOSTRATIGRAPHIC STUDIES OF CRETACEOUS DEPOSITS OF ANAMBRA BASIN, EASTERN NIGERIA

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(Received June 27,2002; accepted August 23,2004)

Upper cretaceous strata of Anambra basin were spot sampled at two locations. A palynological investigation of the forty-one samples from the outcrop section, enabled the recognition of five palynological zones based on pollen and spores. The assemblage zones which are assigned upper Campanian to Maestrichtian age are: *a*). *Tricolpites/Syncolporites/Matonisporites* Assemblage zone (upper Campanian). *b*). *Psilamoncolpites/Zlivisporis* Assemblage zone (Campanian - Maestrichtian). *c*). *Retistephanocolpollenites/Monocolpollenites/Propylipollis* Assemblage zone (Maestrichtian). *d*). *Retidiporites/Verrucatosporites/Buttinia* Assemblage zone (Maestrichtian) and *e*). *Rugulatisporites/Cingulatisporites* Assemblage zone (Maestrichtian). The dominance of the palynomorph assemblage by trilete spores (*Cingulatisporites ornatus*, *Foveotriletes margaritae*, *Zlivisporis blanensis*, and *Verrucatotriletes bullatus*) and monocolpites (*Monocolpites marginatus*, *Longapertites* sp. and *Monocolpollenites* sp.) indicate a swampy environment fringed by herbaceous vegetation. While the dark grey to black, fissile, sulphur stained, pyretic, lignitic and laminated carbonaceous shale suggested a tidal flat environment of deposition. This study therefore enabled the recognition of five informal palynological zones in the upper Cretaceous sediments of Anambra basin and tidal flat environment.

Key words: Palynostratigraphic, Cretaceous deposits, Herbaceous.

EFFECT OF MORDANTS ON COLOR SHADE AND COLOR FASTNESS OF SILK DYED WITH KIKAR AND MADDER BARKS

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(Received September 9, 2002; accepted September 1, 2004)

The silk fabric was dyed with aqueous extract of Kikar bark (*Acacia arabica*) and Madder bark (*Rubia cordifolia*) by using various metal sulphates as mordants. The three techniques of mordanting were used for dyeing the fabric and are known as pre-mordanting, where the fabrics were first mordanted and then dyed with natural dye extract, meta-mordanting (i.e. dyeing in the presence of mordants) and post-mordanting where the dyed fabrics were treated with mordants. The fastness properties i.e. crock fastness, washing fastness and light fastness of the dyed samples were determined and comparison was made for control and samples dyed in the presence of the metal ions. The three fastness of the dyed samples were found to be good to excellent. The color of the dyed silk was investigated on computer color matching system in terms of Reflectance, K/S and CIE lab color values. The effect of different metal ions have been studied with respect to their influence on color shade and fastness properties. The mechanism of mordant interactions with the fabric has been briefly discussed.

Key words: Natural dyes, Mordants, Fastness.

ASSESSING THE SPECIATION PATTERN OF LEAD AND ZINC IN SURFACE WATER COLLECTED FROM ABEGEDE CREEK, IJORA AND LAGOS

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(Received November 6, 2003; accepted September 20, 2004)

A two-stage sequential extraction procedure for the speciation of zinc and lead has been applied to surface water randomly collected from three sites in Abegede Creek, Ijora and Lagos. The determination of the labile and non-labile metals species was carried out by flame atomic absorption spectrophotometry (FAAS). The mean values of non-labile zinc and lead concentrations from the three sites, A, B and C are 0.54 ± 0.25 mg/l; 0.55 ± 0.26 mg/l; $1.13 + 0.76$ mg/l, respectively for zinc and 0.13 ± 0.09 ; mg/l, 0.17 ± 0.07 mg/l; 0.42 ± 0.23 mg/l respectively for lead. These are higher than for the labile species in the three sites; 0.14 ± 0.07 mg/l; 0.21 ± 0.22 mg/l; 0.73 ± 0.82 mg/l, respectively for zinc and ND; 0.02 ± 0.04 mg/l; 0.16 ± 0.22 mg/l, respectively for lead. The statistical analysis of variance of the distribution of zinc and lead in the three sites were estimated at 95% confidence level. The values of metals obtained were compared with Nigeria's background values for some rivers and the World Health Organization limits for drinking water respectively and found to be generally higher especially for lead levels. The probable sources of zinc and lead in the Creek are from natural and point sources, although there could be non-point source contributions from urban run-offs and vehicular exhaust.

Key words: Speciation, Heavy metals, Labile, Non-labile, Flame atomic absorption spectrophotometry.

ADSORPTION OF ACRIDINE ORANGE ON SOME METAL OXIDES

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(Received June 06, 2003; accepted September 22, 2004)

The adsorption studies of acridine orange from aqueous solution were carried out over calcium oxide, magnesium oxide and zinc oxide. The adsorbents were subjected to a few pretreatments and the effect of pretreatment was studied on the extent and mode of adsorption. The adsorption over various pretreated surfaces exhibited three kinds of adsorption pattern, namely, S-type, L-type and H-type. The mode of adsorption is explained on the basis of the adsorption isotherm. The H-type is explained as flatwise adsorption with some ionic micellisation. The L-type has been interpreted as multilayer adsorption (flatwise) with the formation of large ionic micelles. The S-type has been explained as edge on (monodisperse) adsorption. The Freundlich adsorption isotherm are applicable within the limited range of concentration of dye. In few cases, these equations are not applicable due to the complex adsorption mechanism.

Key words: Acridine orange, Metal oxides, Aqueous solution.

Biological Sciences

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ANATOMICAL CHARACTERISTICS OF RICE PLANTS INFLUENCING RESISTANCE AND SUSCEPTIBILITY TO YELLOW STEM BORER

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(Received December 11, 2002; accepted August 3, 2004)

Plant anatomical characters presumably influencing resistance and susceptibility to yellow stem borer (YSB) infestation were studied. Rice varieties having broader and thicker sclerenchymatous hypodermis, compact parenchyma cells of ground tissue, small air spaces in the ground tissue, more vascular bundles with narrower spaces between vascular bundles, ridged stem surface containing vascular bundles and narrower pith are considered to be characters for resistance. Whereas thinner sclerenchymatous hypodermis, loose parenchyma cells of ground tissue, larger spaces between vascular bundles, wider pith and larger air cavities, might be responsible for the susceptibility to (YSB). In the present study TKM6, BR1 and Nizersail were found to be resistant to (YSB), while TN1, IR8, BR3, BR4 and BR14 were susceptible varieties.

Key words: Rice varieties, (YSB) yellow stem borer, Anatomical characters, Resistance.

A NEW SPECIES OF *TYLENCHORHYNCHUS* WITH COMMENTS ON *GEOCENAMUS RUGOSUS* (THORNE AND MALEK 1968) BREZESKI 1991 FROM SINDH

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(Received November 8, 2003; accepted August 7, 2004)

Tylenchorhynchus fatimae sp.n was collected around the roots of coconut field, Malir and coconut plants from PCSIR campus, Karachi is described and illustrated. *T. fatimae* sp.n comes close to *T. brassicae* (Siddiqi 1961), *T. tuberosus* (Zarina and Maqbool 1994), *T. tritici* (Golden *et al* 1969) and *T. rubustoides* (Thorne and Malek 1968) but differs in stylet length, general shape of the body and DGO. *Geocenamus rugosus* (Thorne and Malek 1968) Brezeski 1991 is reported for the first time from Pakistan are listed. Measurements of *Geocenamus rugosus* are given from paratype and rest of the measurements from illustration are mentioned in Table 1.

Key words: Coconut, Nematodes , *Tylenchorhynchus fatimae* sp.n.

TWO NEW *CALOGLYPHUS* BERLESE MITES (ASTIGMATA: ACARIDAE) RECORDED IN PAKISTAN

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(Received January 24, 2003; accepted October 4, 2004)

The taxonomy of *Caloglyphus clemens* and *C. cingentis* was studied. These species were encountered from two different host materials. A key for all the known hypopodes from Pakistan, their comparison of characters, similarity matrix and phenogram have been included.

Key words: Acaridae, Hypopus, New mite species, *Caloglyphus*, Taxonomy.

SKELETAL ANOMALIES IN FISHES COLLECTED FROM KORANGI CREEK AND BACK-WATER OF SANDSPIT ALONG THE COAST OF KARACHI

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(Received July 1, 2003; accepted October 8, 2004)

Vertebral anomalies have been reported in *Liza carinata*, *Valamugil cunnesius* and *Therapon jarbua* from Korangi creek and *L. carinata* collected from backwaters of Sandspit. Detail examination of external morphology and X-rays of fishes showed kypholordosis and scoliosis in the vertebral column. It is presumed that these effects are results of pollutants in the coastal systems of Korangi creek and Sandspit backwaters where heavy pollutants and domestic sewage of the Karachi city is discharged untreated. This study suggests the need of effective management measures to save fisheries resources of the creeks and coastal waters.

Key words: Skeletal anomalies, Fishes, Backwaters, Creeks, Karachi coast.

MINERAL COMPONENTS IMPORTANT FOR HEALTH FROM ANIMAL SOURCES

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(Received December 31, 2002; accepted August 23, 2004)

Animal samples include two different types of snakes, frog and five different types of fishes. The flesh, bones, scales and heads of the animals were separated and analysed for moisture, ash and minerals. The minerals, were not detected from any sample. Cu, Cd, Pb, Co and Cr. The moisture content was generally low. The ash was consistently highest in the bone but consistently lowest in flesh among the fish and in the scale among the snakes. The concentration of the minerals was highly varied among the body parts. The Ca/P ratios ranged from excellent to poor. The Na/K ratios were generally on the high side ranging between 0.55-1.05. The mineral safety index was generally good for Na, P, Mg and Ca, poor for Fe but very bad for Zn. It is an indication that the samples were contaminated by Fe and Zn.

Key words: Animal samples, Ca/P and Na/K ratios, Mineral safety index.

Review Article

Pak. J. Sci. Ind. Res. 2004 **47**(6) 478-481

HIGH TEMPERATURE SI-B-C-N CERAMICS

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The importance of pyrolysis of preceramic organometallic compounds is increasing year by year as a key technology for the synthesis of new inorganic materials. According to this process, preceramic polymers are synthesized from monomer units. After cross-linking of such precursors, the obtained preceramic networks are transformed by pyrolysis into amorphous materials. Further increase of the temperature yields thermodynamically stable crystalline materials. In this paper, the general methods of the synthesis of ceramic materials based on the Si-B-C-N system via thermolysis of preceramic compounds have been reviewed. Bulk materials, coatings and fibers of such materials reveal quite interesting high temperature properties.

Key words: Pyrolysis, Preceramic compounds, High temperature ceramics.

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Journal Articles

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